THE "AVERAGE" AMERICAN A HIGH RISK TRAUMA PATIENT?

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Objectives

- Definition
- Scope of the issue
- Discuss specific anatomic and physiologic considerations
- ABCDEs of ATLS
- EMS/ICU pearls

Disclosures

Trauma and bariatric surgeon

Aging Facts

- Over 65 age group increasing fastest in all developed countries
- Will be 20% of US population by 2030
- 33% of all trauma $ spent on elderly
- Trauma costs 3X more for patients over 60

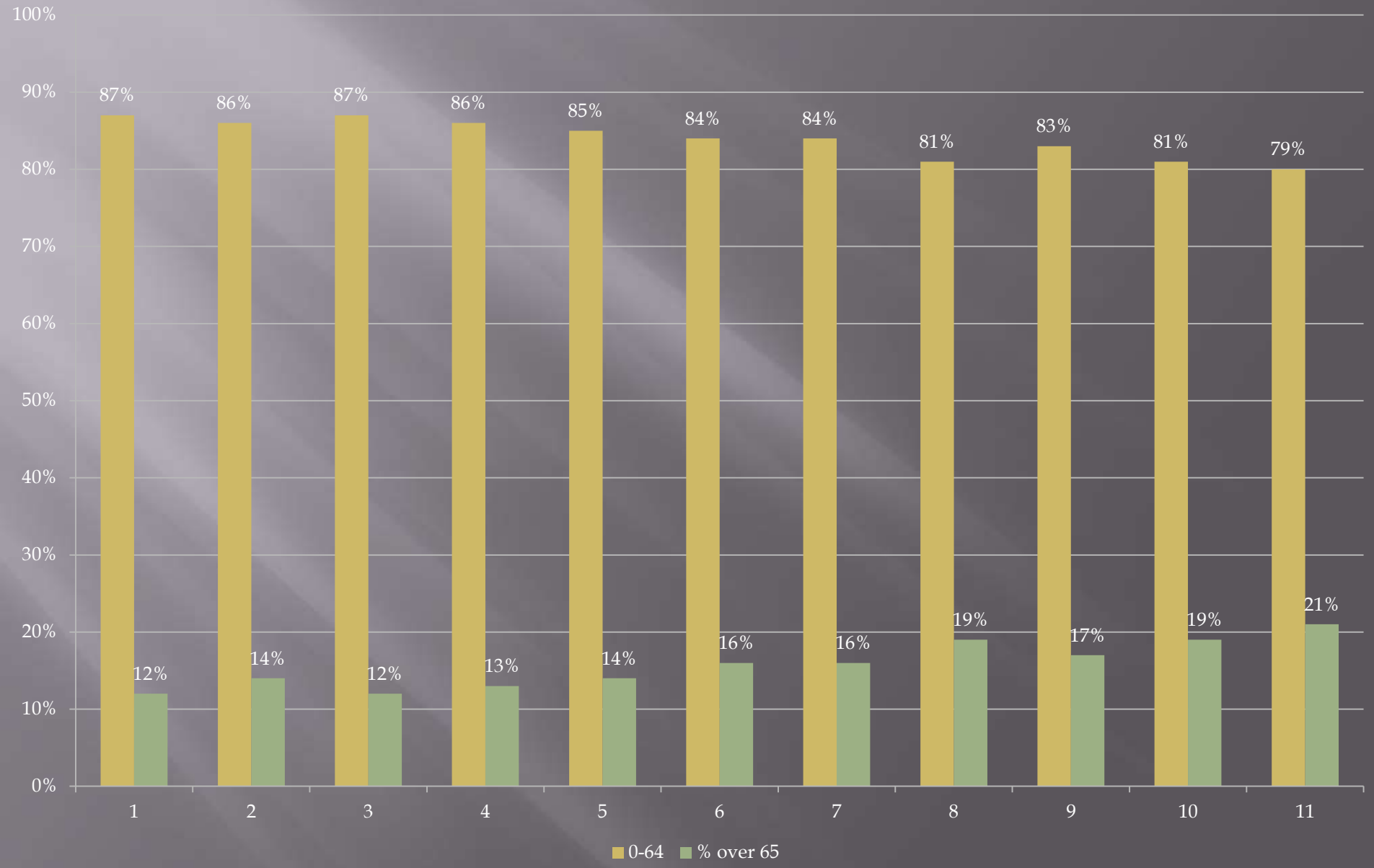
Definition

- Studies disagree on what constitutes “elderly”
- Chronologic age versus physiologic age
- Today’s benchmark: 65 years old
- >65 currently 14% of MT population, will be 20% - 25% by 2050

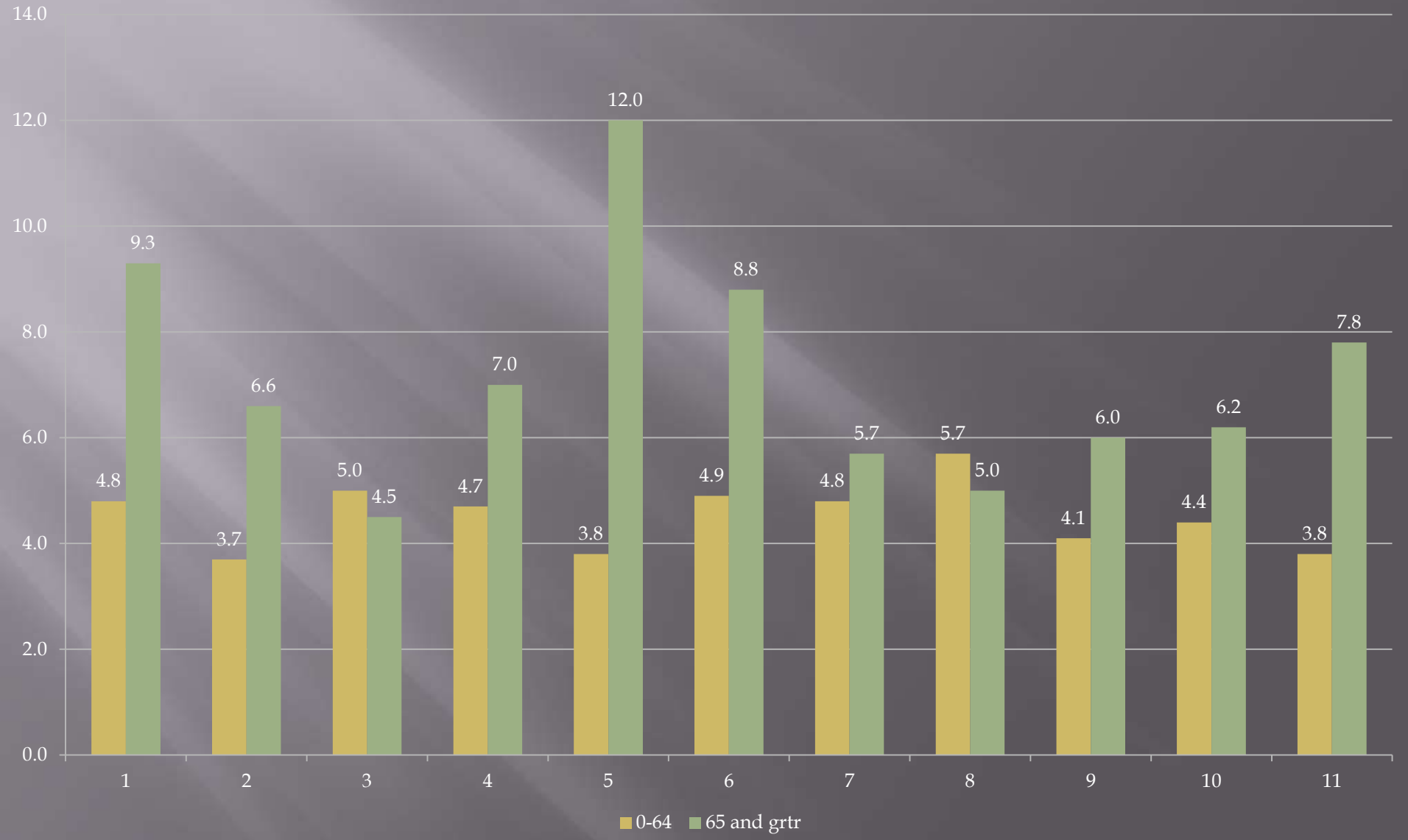
“You’re not old until you’re old.”

Betty Larson, longtime Missoula resident

SPH Trauma Patients By Age



SPH Trauma LOS By Age



SPH Average ISS Per Age


DANGER AHEAD
FASTEN SAFETY BELTS
AND REMOVE DENTURES
GEVAAR VOOR
MAAK GORDELS VAS
EN VERWYDER KUNSTANDE

Case

- 70 year old male on Coumadin for A-fib
- Skiing at Snowbowl, falls and strikes left hip/pelvis
- Does one more run, then goes home
- Collapses after getting out of the hot tub
- EMS arrives

Pulmonary	Cardiovascular
Decreased VC, FRC, FEV & diffusion capacity	Stiff, noncompliant myocardium
Blunted response to hypoxia and hypercarbia	Decreased cardiac output
	Decreased sensitivity to endogenous catecholamines
	Drugs' effects
	Increased SVR
	Baseline HTN

Neurologic

- Decreased brain size 30% by age 70
- More susceptible to subdural hematomas
- Anticoagulants

We **UNDER** triage

Causes of Under Triage

- Increased risk of injury with even minor trauma
- Occult injuries
- “Normal” vital signs don’t mean normal physiology
- Cultural/social biases

Under triage = **2X** increased mortality

Prehospital Considerations

- Minor trauma may = major injury
- Beware of occult injury
- “Normal vitals” does not exclude shock
- Decreased pulmonary reserve = heightened awareness for respiratory support/early airway
- Low threshold for trauma team activation
- Low threshold for Trauma Center transfer

History

- Mechanism of injury but also what happened before
- Medications (Beta blockers, anticoagulants, etc.)
- Underlying illness
- Baseline cognitive, motor function
- ? Advance Directive/POA

ABCs the same

Airway

- No teeth/dentures
- Macroglossia
- DJD of jaw/C-spine
- Frail nasopharyngeal mucosa/? Anticoagulants
- Risk of C-spine injury with minor trauma
- Low threshold for airway

Breathing

- Supplemental O2 mandatory
- Recognize potential need for early airway control
- Chest injuries occur with same frequency as younger but less tolerated
- Adequate pain relief

Circulation

- “Normal” vital signs does not exclude shock
- ? HR >90 and SBP <110
- Trends important
- Use adjuncts early in primary survey (FAST, ABG/base deficits, serum lactate)
- Aggressively resuscitate
- Hypotension/acidosis less tolerated

Disability

- Normal neurologic function does not exclude ICH
- Co-morbidities can complicate assessment
- Consider CT for all elderly patients with head trauma

Anticoagulants

- 10% - 15% of elderly trauma patients
- Coumadin → FFP or PCC + Vitamin K
- Plavix – No reversal agent
- Newer medications currently have no reversal agents
- Having a protocol greatly improves outcomes

Protocol Example

- Anticoagulated + any head trauma rapidly triaged one level higher than if not anticoagulated
- Type, screen and head CT
- Rapid reversal
- Observe overnight even if no ICH found?

Exposure

- Thin skin
- Loss of thermoregulation
- Decreased barrier to infection
- Slower wound healing

Brain/Spinal Cord Injuries

- Subdurals more likely
- More likely to have uncommon injuries with even minor trauma
- DJD effects/kyphosis can predispose to cord injury
- CT is the way to image elderly C-spine

Chest Injuries

- Rib fractures most common
- High index of suspicion even with minor fall
- As rib fracture number increases, so does mortality (19% per rib if over 65 per HMC study in 2000)
- Low threshold for admission
- Low threshold for transfer to higher level of care
- Consider ICU, epidural catheter, early mechanical ventilation

Intraabdominal Injuries

- Same frequency as younger patients
- Abdominal exam less reliable
- Early FAST may be helpful
- Consider CT in stable patients
- Are candidates for non-operative management of solid organ injuries

Pelvic Fractures

- **3 – 5X** mortality
- Chance of bleeding much higher
- Consider any major fracture hemodynamically unstable until proven otherwise
- More prone to bleed/aggressive angioembolization

Hospital Considerations

- Decreased drug metabolism so decrease narcotic dose
- Avoid benzodiazepines
- Remove C-collar quickly once cleared

Summary

- Can have major injury with minor trauma
- Decreased physiologic reserve
- TBI - Low threshold for CT, rapid reversal protocol
- Chest injury/rib fractures - Consider higher level of care, ICU admission, early epidural
- Solid organ injuries - More likely to be occult - Management same as with younger patients
- C-spine - High index of suspicion even with minor trauma - CT preferred modality
- Factor age in trauma team activation, triage and transfer

Summary

Treated aggressively and appropriately, most injured elderly patients will return to their pre-injury status

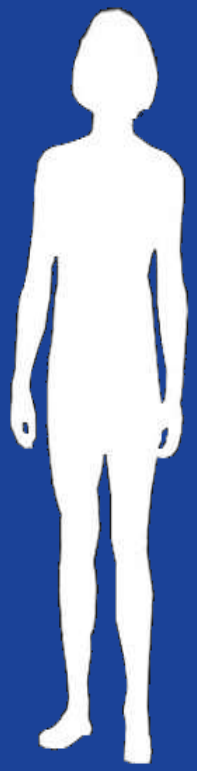
“We’re going to need a bigger boat”

Objectives

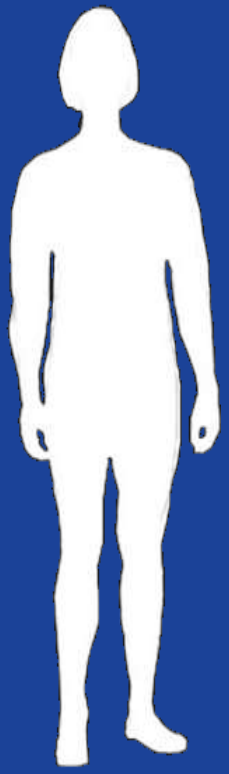
- Pathophysiology of obesity
- Obesity and trauma outcomes
- Obesity and the ABCs

Degrees of Obesity

Normal Weight
(BMI* 18.5 to 24.9)



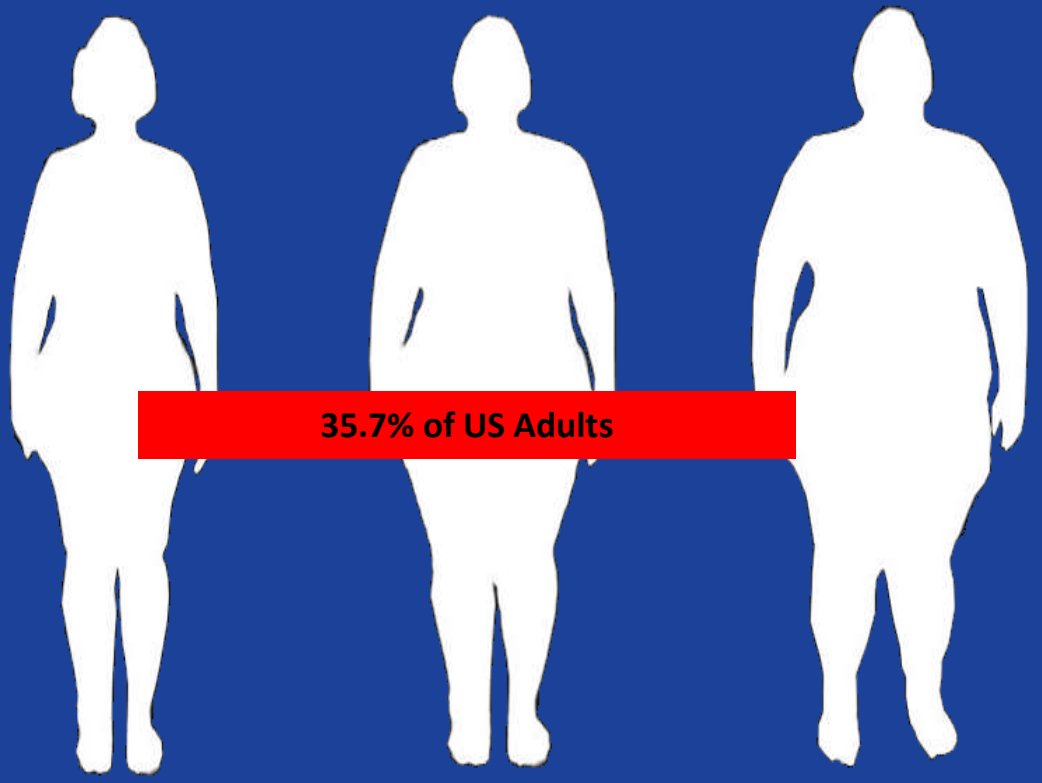
Overweight
(BMI 25 to 29.9)



Obese
(Class I)
(BMI 30 to 34.9)

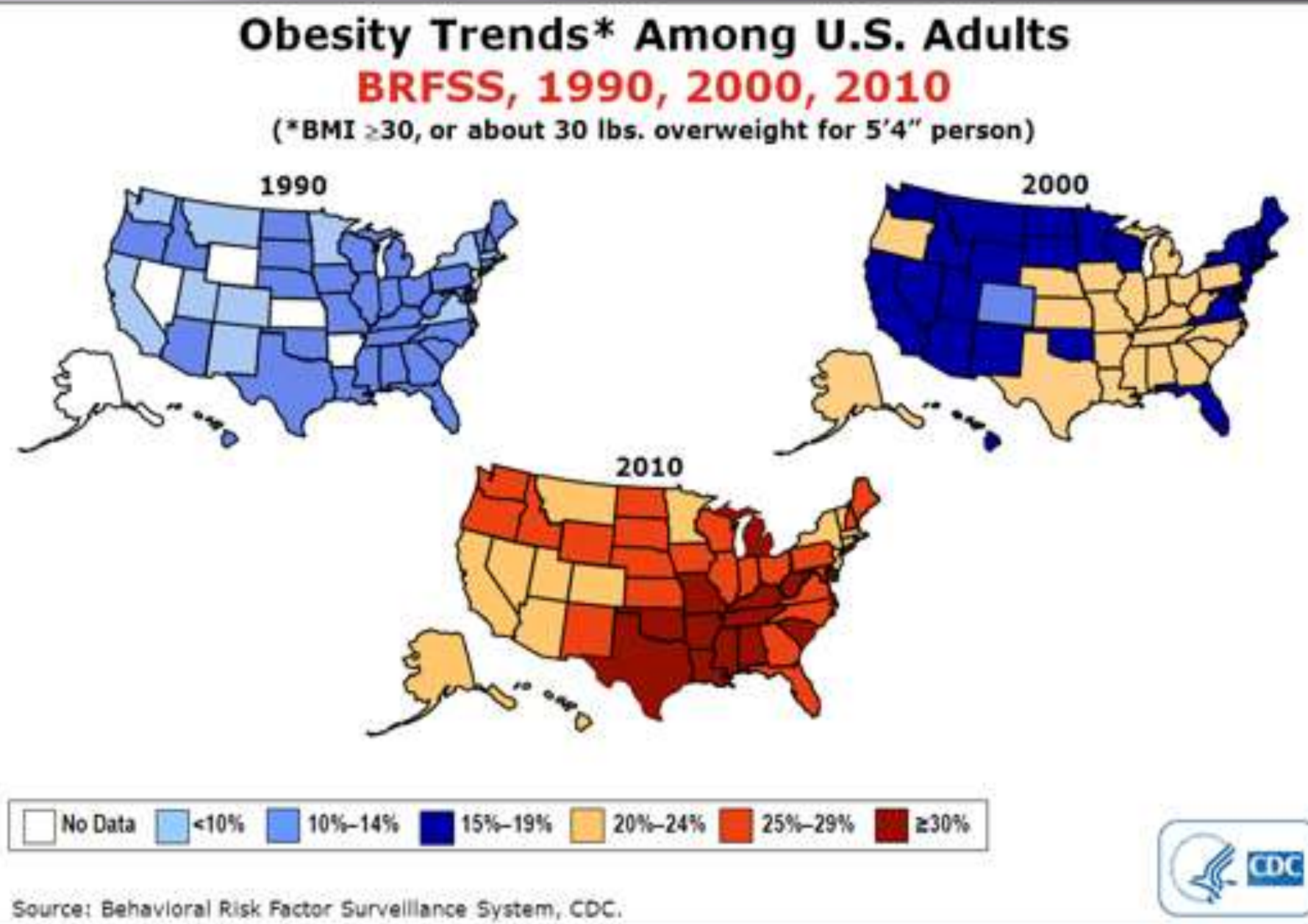
Obese
(Class II)
(BMI 35 to 39.9)

Extremely Obese
(Class III)
(BMI 40 or more)

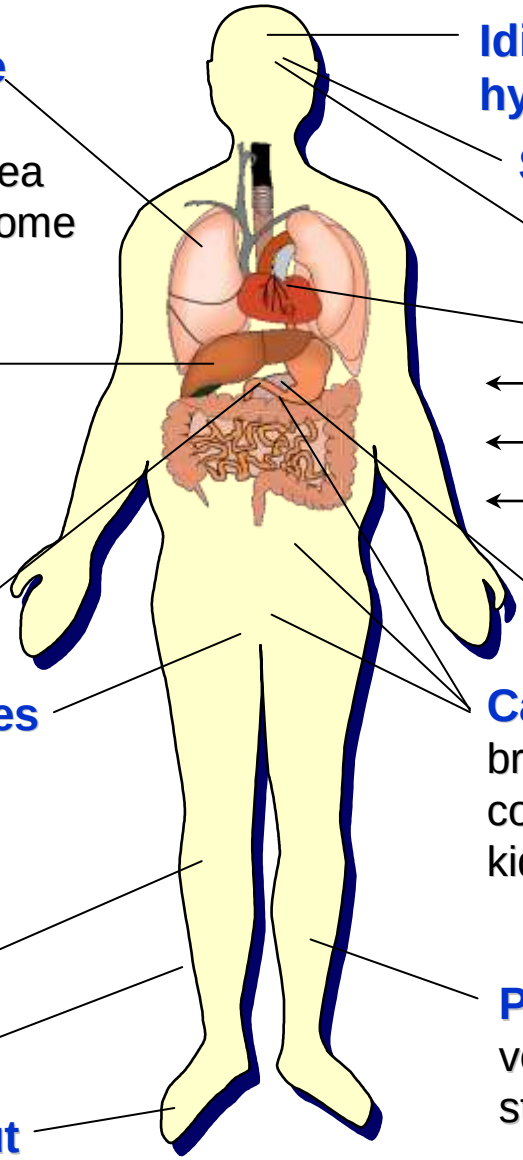


35.7% of US Adults

US Obesity Population Trends



Medical Complications of Obesity



Pulmonary disease
abnormal function
obstructive sleep apnea
hypoventilation syndrome

Idiopathic intracranial hypertension

Stroke

Cataracts

Nonalcoholic fatty liver disease
steatosis
steatohepatitis
cirrhosis

Coronary heart disease

Diabetes

Dyslipidemia

Hypertension

Gall bladder disease

Severe pancreatitis

Gynecologic abnormalities
abnormal menses
infertility
polycystic ovarian syndrome

Cancer
breast, uterus, cervix
colon, esophagus, pancreas
kidney, prostate

Osteoarthritis

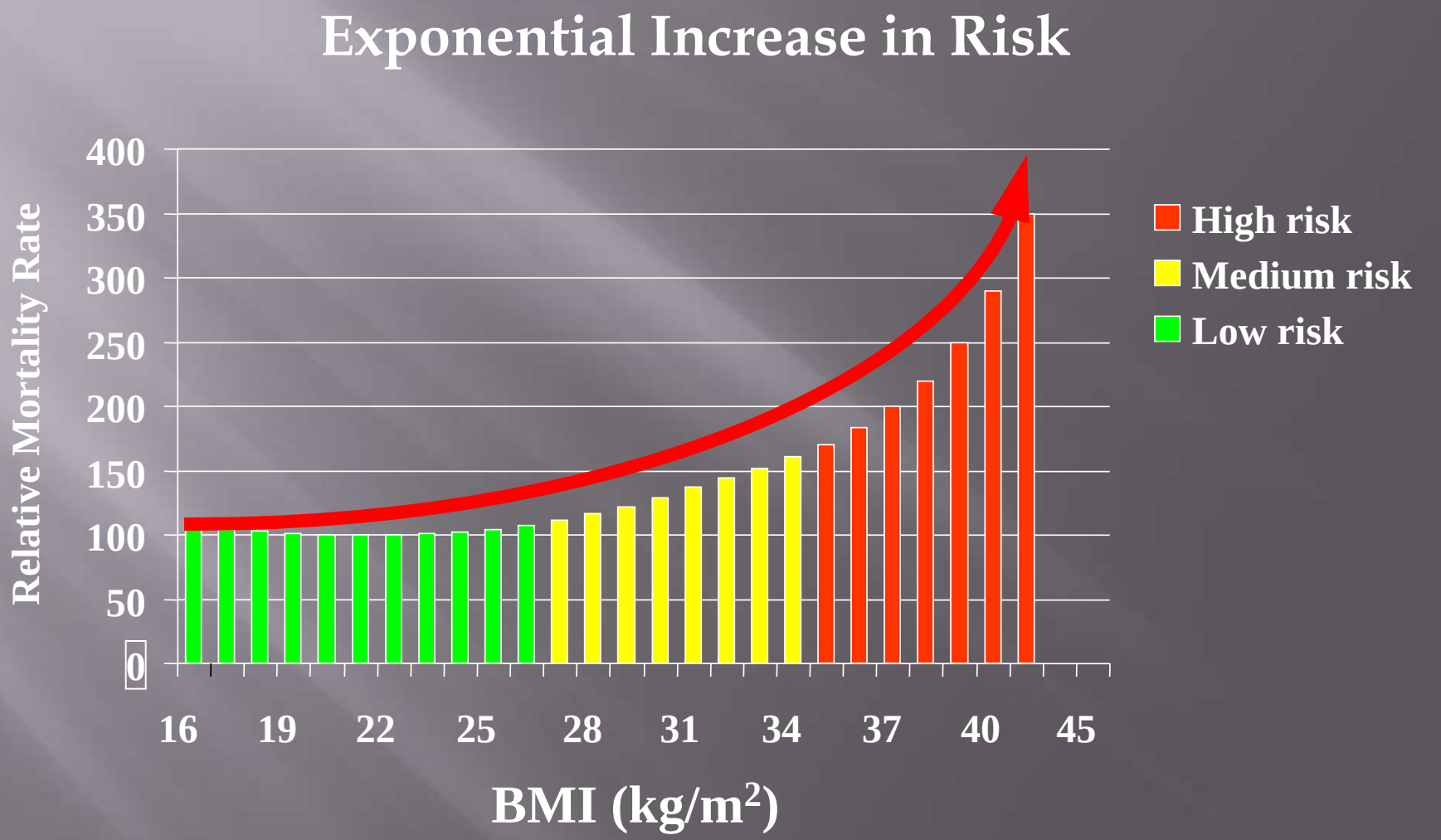
Skin

Gout

Phlebitis
venous
stasis

Source: www.obesityonline.org

BMI vs. MORTALITY



Source: *NIH, NEJM, 1995.*

Cardiovascular Physiology

- Increased blood volume
- Increased stroke volume
- Increased cardiac output
- HTN
- CHF
- LV hypertrophy

Pulmonary Pathophysiology

- Decreased functional residual capacity
- Inefficient respiratory muscles
- Increased work of breathing
- Sleep apnea
- Obesity hypoventilation syndrome
- RV dysfunction

GI Pathophysiology

- GERD
- Intraabdominal hypertension
- Fatty liver
- Gallstones

Renal Pathophysiology

- Chronic kidney disease
- Intrinsic obesity-related glomerulopathy
- Acute kidney injury

Metabolic Syndrome

- Chronic inflammatory state
- Related to adipocytes releasing cytokines
- Leads to HTN, insulin resistance, hypercoagulopathy, liver disease
- Predisposes to MSOF

Obesity and Seat Belt Use

- Normal weight: 70% utilization
- Obese: 45% utilization
- Fit, comfort, need for extensions
- Misconceptions

Injury Patterns

- Less head injuries
- More extremity injuries
- More chest injuries
- Less intraabdominal injuries
- More pelvic fractures

Outcomes

- Longer hospital LOS
- Longer ICU LOS
- More ventilator days
- More complications
- More MSOF
- Mortality mixed

ABCs are the same,

but

trauma + obesity = difficult

Airway

- Airway not identified as a significant risk factor in obese patients
- Maintaining airway while maintaining C-spine precautions may be challenging
- BVM may be challenging
- Pre-oxygenate
- Most experienced personnel with a plan
- Ramping
- Succinylcholine dose based on actual weight
- Surgical airway possible but challenging

Breathing

- Decreased FRC + Pulmonary disease = pre-oxygenate
- CXR may be of limited value
- Needle decompression not reliable
- Chest tubes challenging
- Reverse Trendelenburg best position
- TV based on IBW

Circulation

- BP cuffs
- Access
- FAST may be unreliable
- CT scan weight limits

ICU Considerations

- Nutrition
- Pharmacology

“We are the people our parents warned us about”

- Jimmy Buffett